Follow-up Report on the Occurrence of Bladder and Kidney Cancer in Ashland, Massachusetts

Massachusetts Department of Public Health
Division of Environmental Health Assessment

December 5, 1990

SUMMARY QUESTIONS AND ANSWERS

BLADDER AND KIDNEY CANCER STUDY
ASHLAND, MA

1. Q. How much bladder and kidney cancer is there in Ashland?

   A. Between 1982 and 1986, six bladder cancer cases and six kidney cancer cases were diagnosed among the residents of Ashland. About three kidney cancer cases and six bladder cancer cases would have been expected, based upon state cancer rates. The difference between observed and expected numbers of kidney cancer was statistically significant, but the numbers were small and additional years of data are necessary to see if the difference remains significant.

2. Q. Are there specific areas of Ashland where cancer appeared to be more common?

   A. Initially, when the Department of Public Health (DPH) looked at the cancer incidence data in Ashland, an unusual grouping of four of the six bladder cancer cases in the northeastern part of town, and three of the six kidney cancer cases just south of the Nyanza site. Follow-up work was undertaken by the DPH to determine if this distribution was important.

3. Q. Does the way the cancers were distributed in the town mean the environment caused the cancers?

   A. When undertaking an environmental health investigation, the most important factor is that exposure must have occurred prior to the cases' cancer diagnosis. If the place of residence at the time of diagnosis is similar for a number of individuals with the same type of cancer, one possible explanation is that the individuals share a common exposure. One common exposure may be the environmental, however, other exposures, such as occupational exposures, may be responsible. The geographic grouping of cases may also occur simply by chance alone.

4. Q. Is there a cancer problem in Ashland?

   A. Based upon the compilation of all existing health and environmental information, the number and distribution of bladder and kidney cancer cases diagnosed since 1982 do not appear to be particularly unusual. Furthermore, it is the judgement of health experts outside the DPH who reviewed this data that it is not likely that the environment caused these cancers. No other types of cancer were found to be significantly in excess among the residents of Ashland.

5. Q. Are there factors other than environmental contamination that can cause bladder and kidney cancer?

   A. The main factor that causes both bladder and kidney cancer is cigarette smoking. For example, it is estimated that about 30% of all bladder cancers are caused by smoking. Another 25% are caused by occupational exposures. Medical factors are likely to be responsible for a smaller percentage.

6. Q. What is being done to find out if people are exposed to environmental contamination today?

   A. At present, a formal evaluation called a health assessment is being finalized by the DPH. This evaluation is part of a cooperative agreement with a federal agency (The Agency for Toxic Substances and Disease Registry) to conduct health assessments at federal Superfund sites in Massachusetts. The health assessment is an evaluation of the site, the potential for past and present exposure to these contaminants by residents, and the need for additional environmental monitoring. As a result of wanting to incorporate additional sampling data by the US EPA, the final health assessment is not expected until the Spring of 1991.

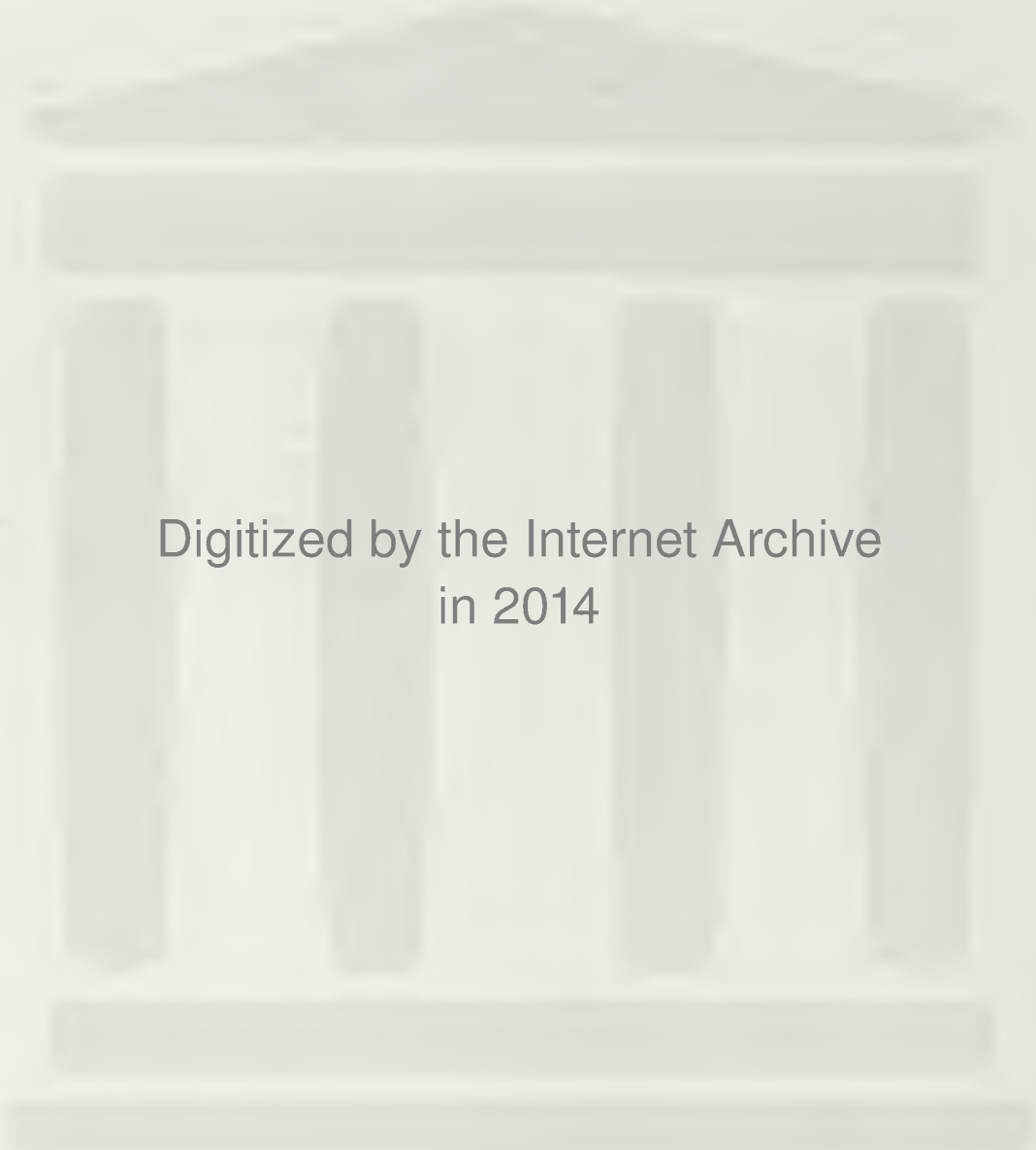

TABLE OF CONTENTS

I. INTRODUCTION

In the Fall of 1988, the Division of Environmental Health Assessment (then called Environmental Epidemiology and Toxicology) of the Department of Public Health (DPH) received a request for a health study from the Ashland Citizen Advisory Committee (CAC). This request was prompted by long-standing concerns over potential environmental exposures resulting from a Superfund site located in town, the Nyanza hazardous waste site.

Through discussions with a citizen advisory committee and the Ashland Board of Health, a strategy was developed to better understand the relationship between existing and potential health effects from the Nyanza site and any other sources of environmental contamination in Ashland.

Since the initial information request, the following public health activities have been completed:

1. A preliminary report issued on bladder and kidney cancer incidence and mortality;
2. The mapping of residences of bladder and kidney cancer cases in Ashland and surrounding communities;
3. The review of medical records of Ashland bladder and kidney cancer cases;
4. Comprehensive interviews of bladder and kidney cancer cases and/or their next-of-kin;
5. The establishment and convening of an expert advisory panel to review available health and environmental data.

In addition, the DPH is presently conducting a health assessment of the Nyanza Superfund site through a special program funded by the U.S. Agency for Toxic Substances and Disease Registry (ATSDR). This evaluation is expected to

be completed by June, 1991.

This report is designed to inform the residents of Ashland about the results of these completed DPH efforts in Ashland.

II. BACKGROUND

The town of Ashland, Massachusetts, is located about 22 miles west of Boston, directly south of Framingham. It had an approximate population in 1980 of 10,000. The Nyanza Superfund site is located near the geographical and commercial center of town. The site began as the U.S. Color and Chemical Company in 1917. This company, which was a manufacturer of textile dyes and intermediaries, changed ownership several times and became Nyanza, Incorporated, in 1965. In 1978, Nyanza, Inc. apparently stopped its on-site dye manufacture.

Materials used and produced at Nyanza, Inc., include more than 100 different dyes, as well as other chemicals such as benzidine, O-tolidine, dianisidine, and 2-naphthylamine, which are carcinogens. Liquid wastes from Nyanza, Inc. were discharged several ways, including into an underground vault, unlined lagoons, and nearby brooks and wetlands. Surface water and soil on the site and groundwater beneath the site are known to be contaminated with numerous toxic chemicals, including volatile organic compounds and heavy metals. One result of liquid discharge at the site was high levels of mercury contamination of the Sudbury River. The DPH, along with other state agencies, issued, in 1986, a health advisory warning against consumption of fish from the Sudbury River.

Releases into the air also occurred as a result of past operations at the site. Air emissions included oleum, bromine and nitric acid.

III. EPIDEMIOLOGIC INVESTIGATIONS

A. Preliminary Report On Cancer Incidence and Mortality - Correspondence concerning cancer incidence in Ashland reported to the Division of Environmental Epidemiology and Toxicology prior to 1988 indicated that three previous requests for investigations of perceived excesses of cancer cases among Ashland residents had been received. In May, 1982, the division was notified of five cases of childhood cancers among residents who lived in Ashland and within a half-mile radius of each other. Information available indicated that the five cases would only have been an excess if all cases were of the same histologic type of cancer, and no histologic information was available.

In June, 1982, an Ashland physician's office reported concern that their office had seen an unusually high number of Ashland residents who had died of cancer. Names, addresses, and histologic diagnoses of 33 cancer deaths were obtained. Analyses determined that there was no evidence of excess cancer mortality in Ashland. The perceived excess may have been attributable to that particular office treating a large proportion of Ashland's cancer patients.

In January, 1984, the division was notified of a perceived excess of prostate cancer deaths in Ashland. The division determined that the current prostate mortality figures were approximately what would be expected based upon the statewide mortality experience.

In mid-1988, ATSDR was asked by federal officials to conduct a health assessment of the Nyanza Superfund site. The ATSDR later directed the DPH, through its cooperative agreement with ATSDR, to conduct the health assessment. In November, 1988 the DPH was asked by the Ashland CAC to report on Ashland cancer incidence and mortality. A written report on the preliminary

health information was shared with the CAC on December 6, 1988. The preliminary health information suggested that kidney cancer incidence was significantly elevated among males (Table 1). No other type of cancer was observed to be significantly elevated. However, some of the six kidney cancer cases and six bladder cancer cases diagnosed between 1982 and 1986 appeared to be unusually distributed within the town. The place of residence at time of diagnosis for three of the six kidney cases was in an area less than one-half mile in radius just south of the Nyanza site. The place of residence of four of the six bladder cases was also within an area less than one-half mile in radius in the northeastern part of town. Because of this distribution and because bladder cancer and some types of kidney cancer are of the types that would be expected if caused by the kinds of chemicals used at the Nyanza site, it was determined that further investigation was necessary in order to establish the relationship, if any, between the Ashland environment and the occurrence of bladder and kidney cancer.

At the December, 1988 CAC meeting, the DPH also issued a well advisory to residents in several Ashland neighborhoods. This advisory recommended that residents in these areas avoid drinking and cooking with well water from private wells. The town's public water supply was not affected by the advisory. The advisory was issued as a precautionary measure because of the distribution of cancer cases within the town and because chemicals in the groundwater from the Nyanza site might have contaminated private wells. The advisory was lifted by the DPH in April of 1989 after water sampling of private wells found no contamination by chemicals that may have originated at the Nyanza site. The DPH reimbursed residents who were advised not to use water for monies expended on bottled water.

In July of 1989 the DPH, with assistance from the U.S. Centers for Disease Control (CDC), began discussions with the CAC on how to best clarify the role of the environment in the occurrence of cancer in Ashland, since preliminary health data did not rule out the environment as a factor and information that was available from the Cancer Registry on other risk factors did not readily explain the geographic distribution of the cancers either. Most public health investigations involving a relatively small number of cancer cases as observed in Ashland, would be inconclusive. However, an approach was suggested by the DPH in order to provide more definitive information to the citizens of Ashland. The approach focused on compiling available health and environmental data and having that data reviewed by a panel of public health experts from outside the DPH.

B. Mapping of Cancer Cases in Surrounding Towns - Bladder and kidney cancer cases were mapped by street address for cases diagnosed among the residents of the neighboring towns of Framingham, Holliston, Hopkinton, Sherborn, and Southborough. This mapping was done to determine whether there was any unusual distribution of cancer cases near the Ashland town line. The results indicated that the residences of bladder and kidney cancer cases in the neighboring towns did not appear to have an unusual distribution or to cluster near the town line.

C. Medical Record Review - The information known about the bladder and kidney cancer cases at the time of the December, 1988 preliminary health report was limited to that reported to the Massachusetts Cancer Registry. That information is basically limited to age, sex, usual occupation, and smoking status. Frequently, Registry information on occupation and smoking status is

incomplete. Furthermore, no information on medical history is available. The medical records of each bladder and kidney cancer case were reviewed to confirm histologic diagnosis, smoking history, age at diagnosis, occupational and residential histories, and to obtain additional information pertaining to other factors that could cause bladder or kidney cancer and that may have been documented in the medical record.

Each hospital, where a case was diagnosed, was contacted to request access to the case's medical record. The record confirmed the information provided by the Registry, however, more information on residential, occupational, and smoking histories remained incomplete. Information on medical history, though, suggested at least one of the cases had a history of medical problems possibly placing the individual at higher risk of cancer. In addition, one case, correctly identified as a kidney cancer, was of a histologic type more etiologically similar to bladder cancer than kidney cancer.

D. Case Interviews - Initially, interviews of the cases were not part of the investigative approach since the number of cases was too small to conduct a case-control epidemiologic study and interviewing only the cases would not permit the possible cause(s) of the cancers to be established. However, after the limited information collected from the medical record review, experts in cancer epidemiology outside the DPH were asked about the value of conducting case-interviews only. While, the experts all agreed that interviewing cases and controls would be preferred, case-interviews might provide some useful information. The Ashland CAC and Board of Health also concurred. As a result, the DPH prepared a questionnaire that was designed to obtain detailed information on residential history, potential occupational exposures, other risk factors for bladder and kidney cancer, medical history, and potential

environmental exposures in Ashland. The questionnaire was reviewed by expert epidemiologists and the Ashland Board of Health before being finalized.

Before conducting the interviews, the diagnosing physician of each case was contacted to determine if there was any reason why the case should not be contacted for an interview. A letter was then sent to each case or the next-of-kin introducing the study and requesting an interview. The interviews lasted approximately one hour and were conducted in the respondents home or other similar location. The data collected from the interviews are summarized below. Tables 2 through 14 present the results for all interviewed cases diagnosed between 1982 and 1986. Tables 15 through 22 focus on select results only for cases who had resided in the two geographic "clusters". The Appendix to the report provides interview data for three cases diagnosed after 1986.

Table 2 shows the number of bladder and kidney cancer cases diagnosed between 1982 and 1986 who participated in the interviews. One of the six bladder cases and one of the six kidney cases did not participate. The reason they did not participate was that an appropriate respondent could not be located.

Table 3 indicates that of the five bladder cases included in the interview study, only one case was deceased. Three of the five kidney cancer cases who were included in the study were deceased.

Tables 4 and 5 show the distribution of cases by year of diagnosis and age at diagnosis. Age at diagnosis for interviewed bladder cancer cases ranged from 28 to 70 years. For kidney cases, age at diagnosis ranged from 50 to 85 years. No children were diagnosed with either of these cancers during the years 1982-1986. One case was under age 45 (bladder cancer). Overall, the age at diagnosis for the bladder cancer cases was slightly younger than expected. However, the ages of the kidney cases is about what is expected.

Tables 6, 7, and 8 depict the number of cases that reported some non-environmental risk factor for bladder or kidney cancer. Cigarette smoking is the most important risk factor for both bladder and kidney cancer. All five interviewed bladder cancer cases reported that they had regularly smoked cigarettes for at least ten years. Two of the kidney cancer cases also smoked.

Family history of bladder or kidney disease is a less important risk factor than others mentioned but might predispose an individual for bladder or kidney cancer, even in an individual who had no other environmental or non-environmental risk factor. All the female bladder and kidney cancer cases reported a family history of bladder or kidney disease (Table 7). None of the males reported such a history.

Occupational exposures to the kinds of chemicals used at the Nyanza site can also place an individual at a higher risk of bladder and kidney cancer. Usually, occupational exposures are at a higher dose than environmental exposures, which might make them more important. Only one of the interviewed cancer cases reported occupational exposure that could have resulted in exposure to chemicals like those that can cause bladder or kidney cancer. However, based upon job title, the interview suggested that, overall, one bladder and two kidney cases were possibly exposed to chemicals that can cause these cancers. The remaining cancer cases reported low risk occupations, such as administrative worker (Table 9).

Table 9 shows the distribution of interviewed cases by number of years of residence in Ashland. This information is important if environmental exposures are a plausible explanation for the occurrence of bladder and kidney cancer in Ashland. Every type of cancer is characterized by an estimated number of years describing the length of time from when a cancer first develops to when it is diagnosed. For an environmental exposure to be plausible, this

length of time must be shorter than the number of years of residence prior to diagnosis. For both bladder and kidney cancer, this time period is estimated at approximately twelve to fifteen years. Table 9 shows that one bladder case did not likely live in Ashland long enough for the environment to have been a plausible explanation for the cancer. The length of residence for one kidney cancer case was of borderline relevance. Environmental exposure could not be ruled out based upon length of residence for four bladder and four kidney cases.

Tables 10, 11, and 12 illustrate how the cases responded to selected questions pertaining to living in Ashland. Table 10 shows only one kidney cancer case ever used a private well while living in Ashland. This result indicates that if contaminated groundwater had affected private wells in the past, it could not have been an explanation for the distribution of cancer in Ashland.

Having the potential for exposure is another prerequisite for the environment to be a plausible explanation for the occurrence of cancer. It was shown above that the potential for exposure from drinking contaminated groundwater essentially did not seem to exist for the cases interviewed. Another means of exposure to environmental contaminants is through recreational activities. The purpose of Tables 11 and 12 is to depict the number of cases that were of school age while living in Ashland. School-aged children might be more likely than adults to play on the Nyanza site and also cross the site on the way to school and, thereby, become exposed to contaminated soil and water. However, the interviews revealed that only one case resided in Ashland as a school-aged child. One additional case first resided in Ashland in her late teens.

Although few cases were of school-age while living in Ashland, some of the cases, nevertheless, reported engaging in recreational activities on the Nyanza site. Two such cases reported discolored clothing after being on the site, suggesting exposure to chemical dyes. A third individual observed discolored snow and recalled vapors emanating from the site (Table 13).

Table 14 attempts to summarize the information collected by interview for cases reporting a non-environmental risk factor for bladder or kidney cancer. Only two cases (kidney cancer) reported no non-environmental risk factors. However, it is important to note that the presence of a non-environmental risk factor does not mean that the factor caused the cancers. It is just as possible that some other factor caused the cancers or that two factors, such as a non-environmental exposure and an environmental exposure, worked together to cause the cancers. It is not possible for interviews with cases only and no controls to make a statement about the causal role of any specific factor. The results of case interviews can only suggest issues deserving further investigation and, similarly, those issues not deserving of further investigation. The results of these interviews suggest that most cases had some non-environmental risk factor for bladder or kidney cancer and that few cases seemed to have any clearly identifiable potential for exposure to chemicals at the Nyanza site.

Tables 15-22 show the interview results for the three kidney and bladder cancer cases that represent the original geographic cluster.

Table 15 indicate that all of the 7 cluster cases were interviewed. Table 16 describes the years of diagnosis of these cases.

The age at diagnosis for these cases is shown in Table 17. This table shows that the two youngest cancer cases resided in one of the cluster areas.

With regard to non-environmental risk factors for bladder and kidney cancer, all but one of the seven cases had been cigarette smokers (Table 18). Two of the seven case had held jobs that may have led to occupational exposures to chemicals associated with the development of bladder and kidney cancer.

Table 20 illustrates the number of years of residence of the cluster cases in the cluster area. All of the bladder cancer cases had resided in the area of the cluster for at least 16 years. All but one of the kidney cancer cases had resided in that cluster area for more than 16 years. Given the latency period for these cancers as discussed earlier, it would not be possible to rule out the environment based on length of residence except for one kidney cancer case.

Table 21 shows the age at first residence in the cluster area. Only one case resided in the area as a child, that increase the possibility of of exposure to environmental contaminants from play habits. Based upon what the cases indicated, only one individual reported any know adverse environmental exposure. This is in the form of fumes believed to originate from the Nyanza site and unusually colored snow.

E. ATSDR Health Assessment - The Health Assessment is an on-going evaluation of (1) the contaminants identified on a Superfund site, (2) the past, present, and future potential for exposure to these contaminants by residents, and (3) the possible human health impact from exposure. The health assessment places special emphasis on health outcome data and the community's health concerns. The findings of the health assessment are used to determine the need for activities, such as, a health advisory, a health study, or other health related activity, and additional monitoring data. The Health Assessment report for the Nyanza site is currently in final preparation and, after new

groundwater monitoring data is available, will undergo external review by the ATSDR within the next few months. Information from the Health Assessment was, however, shared with the Expert Advisory Committee, discussed in the next section.

F. Expert Advisory Panel - To review all available environmental and health and to apply an expertise developed from similar investigations in other parts of the country, an expert advisory panel was convened. The members of the Panel were:

Thomas J. Mason, PhD
Director of Epidemiologic Research
Fox Chase Cancer Center
Philadelphia, PA

Timothy E. Aldrich, PhD
Director, Cancer Surveillance Section
North Carolina Department of Human Resources
Raleigh, NC

John D. Powell, PhD
Associate Professor of Political Science
Tufts University
Medford, MA

Martha J. Steele, MPH
Senior Health Scientist
Gradient Corporation
Cambridge, MA

The Panel was chosen on the basis of their experience in dealing with issues surrounding the definition of a cluster, the risk factors for bladder and kidney cancer, environmental exposure assessment, and risk communication. The charge presented to the Panel was:

1. To assess the public health significance of the occurrence of bladder and kidney cancer in Ashland residents;

2. To assess the adequacy of the existing data for determining the potential for health effects from exposure to environmental contaminants;

3. To recommend further epidemiologic and/or environmental studies to clarify significant scientific issues and fill relevant data gaps;

4. To identify further actions, studies, and/or interventions which state and/or local officials could implement that would minimize current or future health risks, if any; and

5. To develop an action plan to communicate the group's findings and recommendations to the community.

In response to this charge, the Panel received documentation on the major pieces of available health and environmental data, received technical briefings from representatives of the EPA and the DPH, and heard community concerns from representatives of the Ashland CAC and the Board of Health. The Panel's conclusions and suggestions are shown in full in Figure I.

IV. Conclusion

The purpose of the DPH follow-up investigation was to determine if the geographic distribution of bladder and kidney cancer in Ashland appeared unusual or clustered in certain parts of town that might suggest a common environmental exposure. Particular attention was given to the potential for occupational and environmental exposures of the cases. The conclusion drawn from the various epidemiologic investigations, including the comments of the Expert Advisory Panel, is that the cases of bladder and kidney cancer diagnosed among Ashland residents between 1982 and 1986 do not appear to be unusually clustered nor does it appear that the distribution of cancer cases in Ashland is likely related to the Nyanza site or environmental exposures associated with the site.

FIGURE 1

FINAL REPORT

of the

Ashland Advisory Panel

The Panel believes that the DPH took appropriate steps in investigating the incidence of bladder and kidney cancer in Ashland residents. We commend their efforts.

RECOMMENDATIONS

1. The Panel believes that the number and geographic distribution of bladder and kidney cancer cases observed in Ashland is not an atypical finding in public health investigations of geographic clusters and, as a result, this distribution or clustering of cancer in Ashland does not appear unusual.

2. The best available health and environmental data do not support a casual role for environmental hazards in the occurrence of bladder and kidney cancer in Ashland.

3. Based on information provided by community and public agencies, the Panel believes that potential exposures to environmental contaminants may have existed in the past for Ashland residents. The types of exposure that may have occurred include:

- Exposure via ingestion of and/or dermal contact to soils and surface water on the Nyanza site inself;

- Exposures via ingestion of and/or dermal contact to fish, sediment, and surface water from the Sudbury River and the Chemical Brook; and

- Exposure via inhalation of and/or dermal contact to dust and vapors emanating from the Nyanza site and/or the industries previously operating on the site.

These potential exposures could have contributed to a variety of disease outcomes. However, information on health outcomes, other than cancer, is not readily accessible from existing data.

4. The Panel believes that, as an appropriate follow-up activity by the town of Ashland, all persons who resided in Ashland during the 1960s be identified, so that the mortality and cancer incidence information on these individuals can be ascertained. We believe the 1960s to be the critical time period based on the in-migration of individuals in the 1970s and 1980s, and on the latency period of the diseases plausibly related to these potential exposures. The need for any additional follow-up action would be determined based on the development of this community health profile.

TABLE 1

Standardized Incidence Ratios (SIR)
For Bladder and Kidney Cancer Cases
Diagnosed between 1982 and 1986
Among Ashland Residents

Bladder Cancer

	Observed No.	Expected No	SIR
Males	4	4.3	92
Females	2	1.6	122

Kidney Cancer

	Observed No.	Expected No.	SIR
Males	5	2.1	235*
Females	1	1.3	75

*Statistically significant

TABLE 2

Participation in Interview Case Series
of Bladder and Kidney Cancer Cases
Diagnosed between 1982 and 1986

Bladder Cancer

Number of Cases Diagnosed	6
Number of Cases Who Participated	5

Kidney Cancer

Number of Cases Diagnosed	6
Number of Cases Who Participated	5

TABLE 3

Vital Status of Interviewed
Bladder amd Lodmeu Cancer Cases

Bladder Cancer

Vital Status of Case	Males	Females	Totals
Deceased	1	0	1
Living	2	2	4
TOTALS	3	2	5

Kidney Cancer

Vital Status of Case	Males	Females	Totals
Deceased	2	1	3
Living	2	0	2
TOTALS	4	1	5

TABLE 4

Distribution of Interviewed Bladder and
Kidney Cancer Cases
By Year of Diagnosis

Bladder Cancer

Year of Diagnosis	Males	Females	Total
1982	0	1	1
1983	0	1	1
1984	1	0	1
1985	1	0	1
1986	1	0	1
TOTALS:	3	2	5

Kidney Cancer

Year of Diagnosis	Males	Females	Total
1982	1	0	1
1983	1	1	2
1984	1	0	1
1985	1	0	1
1986	0	0	0
TOTALS:	4	1	5

TABLE 5

Distribution of Interviewed
Bladder and Kidney Cancer Cases
by Age at Diagnosis

Bladder Cancer

Age at Diagnosis	Males	Females	Total
0-19	0	0	0
20-44	0	1	1
45-64	1	1	2
65-74	2	0	2
75-84	0	0	0
85+	0	0	0
TOTALS	3	2	5

Kidney Cancer

Age at Diagnosis	Males	Females	Total
0-19	0	0	0
20-44	0	0	0
45-64	2	0	2
65-74	1	0	1
75-84	0	1	1
85+	1	0	1
TOTALS	4	1	5

TABLE 6

Distribution of Interviewed
Bladder and Kidney Cancer Cases
by Smoking Status

Bladder Cancer

Cigarette Smoking Status	Males	Females	Total
Ever Smoked	3	2	5
Never Smoked	0	0	0
TOTAL	3	2	5

Kidney Cancer

Cigarette Smoking Status	Males	Females	Total
Ever Smoked	2	0	2
Never Smoked	2	1	3
TOTAL	4	1	5

TABLE 7

Distribution of Interviewed
Bladder and Kidney Cancer Cases
By History of Bladder/Kidney Disease in Family

Bladder Cancer

History of Bladder/Kidney Disease in Family	Males	Females	Total
Yes	0	2	2
No	3	0	3
TOTAL	3	2	5

Kidney Cancer

History of Bladder/Kidney Disease in Family	Males	Females	Total
Yes	0	1	1
No	4	0	4
TOTAL	4	1	5

TABLE 8

Distribution of Interviewed
Bladder and Kidney Cancer Cases
By Occupational Risk Category

Bladder Cancer

Occupational Risk Category*	Males	Females	Total
No/Low Risk	2	2	4
Higher Risk	1	0	1
Totals	3	2	5

Kidney Cancer

Occupational Risk Category*	Males	Females	Total
No/Low Risk	2	1	3
Higher Risk	2	0	2
Totals	4	1	5

* Higher Risk Category = Occupations with potential for exposure to bladder and kidney cancer carcinogens, e.g., workers in leather, rubber, or dye industries.
No/Low Risk Category = Occupations with little or no potential for exposure to bladder and kidney cancer carcinogens, e.g., workers in administration or sales.

TABLE 9

Distribution of Interviewed
Bladder and Kidney Cancer Cases
By Number of Years of Residence in Ashland

Bladder Cancer

Years of Residence in Ashland	Males	Females	Total
≤ 10	1	0	1
11-15	0	0	0
16-20	1	0	1
> 20	1	2	3
Totals	3	2	5

Kidney Cancer

Years of Residence in Ashland	Males	Females	Total
≤ 10	0	0	0
11-15	1	0	1
16-20	1	0	1
> 20	2	1	3
Totals	4	1	5

TABLE 10

Distribution of Interviewed
Bladder and Kidney Cancer Cases
By Type of Water Supply at Ashland Residences

Bladder Cancer

Ashland Water Supply	Males	Females	Total
Municipal	3	2	5
Private Well	0	0	0
Totals	3	2	5

Kidney Cancer

Ashland Water Supply	Males	Females	Total
Municipal	4	0	4
Private Well	0	1*	1
Totals	4	1	5

* For first 20 years of Ashland residence only.

TABLE 11

Distribution of Interviewed
Bladder and Kidney Cancer Cases
By Whether Cases Attended School in Ashland

Bladder Cancer

Attended School in Ashland	Males	Females	Total
Yes	0	0	0
No	3	2	5
Totals	3	2	5

Kidney Cancer

Attended School in Ashland	Males	Females	Total
Yes	0	0	0
No	4	1	5
Totals	4	1	5

TABLE 12

Distribution of Interviewed
Bladder and Kidney Cancer Cases
By Whether Cases Ever Noticed Environmental Problems

Bladder Cancer

Noticed Environmental Problems*	Males	Females	Total
Yes	1	0	1
No	2	2	4
Totals	3	2	5

Kidney Cancer

Noticed Environmental Problems*	Males	Females	Total
Yes	2	0	2
No	2	1	4
Totals	4	1	5

* Fumes in air from Nyanza, discolored snow from chemicals, discolored clothing from chemicals.

TABLE 13

Distribution of Interviewed
Bladder and Kidney Cancer Cases
By Presence of One or More Risk Factors
for Bladder/Kidney Cancer

Bladder Cancer

Presence of Risk Factor*	Males	Females	Total
Yes	3	2	5
No	0	0	0
Totals	3	2	5

Kidney Cancer

Presence of Risk Factor	Males	Females	Total
Yes	2	1	3
No	2	0	2
Totals	4	1	5

* Presence of one or more recognized risk factors for bladder or kidney cancer noted, i.e., smoking, family history of bladder/kidney disease, medical history of related bladder/kidney disease, and higher risk occupational category.

APPENDIX

Summary of Interview Data on Bladder and Kidney Cancer Cases Diagnosed After 1986

Bladder Cancer

	Males	Females
Number	1	1
Date of Diagnosis	1987	1987
Vital Status	Deceased	Deceased
Smoking Status	Smoked	Never Smoked
Family History	No	No
Occupation	Low Risk	Low Risk
Years of Residence	23	37
Age at Diagnosis	73	82

Kidney Cancer

	Males	Females
Number	1	0
Date of Diagnosis	1987	
Vital Status	Living	
Smoking Status	Never Smoked	
Family History	No	
Occupation	High Risk	
Years of Residence	18	
Age at Diagnosis	44	